

PATENT ABSTRACTS OF JAPAN

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(21)Application number : 06-325314

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INC:THE

HITACHI CABLE LTD

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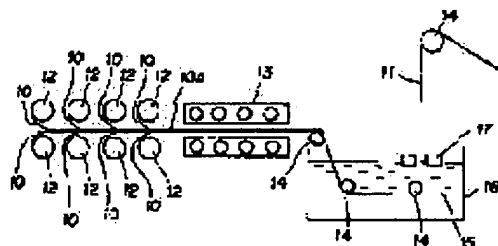
SUGA NOBUAKI

(54) PRODUCTION OF FIBER REINFORCED COMPOSITE WIRE

(57)Abstract:

PURPOSE: To obtain a fiber reinforced composite wire having excellent performability and bending characteristics by bundling plural pieces of fiber bundles (yarn) formed by bundling plural long-sized fibers which are respectively delivered to form a core wire and immersing the core wire into the melt of aluminum or aluminum alloy.

CONSTITUTION: The fiber bundles 10 delivered from plural bobbins 12 are bundled to form the composite core wire 10A. The composite core wire is introduced into a preheating furnace 13 and is preheated and thereafter, the core wire is immersed into the molten metal 15 of the aluminum or aluminum alloy. At that time, plural rolls 14 are arranged in a molten metal storage tank 16 in such a manner that the composite core wire 10A is immersed over a specific length in the molten metal storage tank 16. After the composite core wire 10A is sufficiently



immersed in the molten metal 15, the composite core wire is pulled upward as a composite strand 11 via a drawing die 17. As a result, the excess molten metal 15 sticking to the outer periphery of the composite strand 11 is squeezed off. Further, the composite strand is plastically worked to a prescribed outside diameter, by which the composite strand is continuously produced. The fibers to be used are preferably silicon carbide.

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CLAIMS

[Claim(s)]

[Claim 1] The manufacture approach of the fiber strengthening compound line which summarizes two or more long fiber sent out, respectively in the shape of a bundle, considers as a fiber bundle (yarn), and is characterized by guiding the core wire which comes to bundle two or more said fiber bundles (yarn) to the molten metal tub which filled the molten metal of aluminum or an aluminum containing alloy to coincidence, being immersed, and making said aluminum or aluminum containing alloy adhere to the periphery of said fiber bundle (yarn) continuously.

[Claim 2] Summarize two or more long fiber sent out, respectively in the shape of a bundle, and it considers as a fiber bundle (yarn). Guide to coincidence the core wire which comes to bundle two or more said fiber bundles (yarn) at aluminum or the molten metal tub of an aluminum containing alloy, and it is immersed. The manufacture approach of the fiber strengthening compound line characterized by making said aluminum or aluminum containing alloy adhere to the periphery of said fiber bundle (yarn) continuously so that it may become a predetermined rate of the fiber volume by drawing out said fiber bundle (yarn) for a drawing dice after being immersed in said molten metal.

[Claim 3] Said long fiber is the manufacture approach of the 1st term of a claim which consists of silicon carbide, and a fiber strengthening compound line given in the 2nd term.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the manufacture approach of a fiber strengthening compound line of having enabled it to manufacture continuously the compound strand which is reinforced with long fiber and fits the use to the transmission line, about the manufacture approach of a fiber strengthening compound line.

[0002]

[Description of the Prior Art] Conventionally, various approaches as the manufacture approach of a fiber strengthening compound wire rod are proposed. There is a method of manufacturing a compound strand continuously with the melting penetration method indicated by JP,4-44366,B to which core wire and a conductor layer are stuck by making it solidify, cooling, drawing out molten metal continuously, passing a dice, and performing a drawing, after making the molten metal which fused the good conductor metal adhere to the periphery of core wire which bundled the carbon fiber and preparing a conductor layer in it.

[0003] The structure of the compound strand manufactured by drawing 3 with the melting penetration method is shown. (a) ***** and (b) It is the cutting plane of the die-length direction, and it has the compound line 4 which consists of the long fiber 2 which forms core wire in the core of the compound strand 1, a staple fiber, or a whisker 3, and the compound line 4 is covered with aluminum or an aluminum containing alloy 5.

[0004] The compound strand 1 of the above-mentioned structure is manufactured using two or more preforming wires (middle material) constituted by compound-izing about 500 silicon carbide fiber with aluminum. Drawing 4 (a) (b) The cross section of the compound strand manufactured using the preforming wire 6 is shown, and a periphery is covered with aluminum or an aluminum containing alloy 8, while aluminum or an aluminum containing alloy 8 will permeate the gap 7 formed between the preforming wires 6 if two or more preforming wires 6 are bundled and it is immersed in the molten metal of aluminum so that it may be illustrated. The aluminum or the aluminum containing alloy 8 which covers the periphery of the preforming wire 6 is (b) by being drawn out for a drawing dice (not shown). It is processed into the shown enveloping layer 9.

[0005]

[Problem(s) to be Solved by the Invention] However, in order to use the core wire which consists of specific numbers of fiber according to manufacture of the compound strand by the conventional melting penetration method, the dimension and structure of a preforming wire are limited to the specific range. Therefore, two or more preforming wires must be twisted to obtain the compound strand which has the dimension and structure of being suitable for the transmission line, corresponding to an application, and there is a problem that a production process makes it complicated in it.

[0006] Moreover, when the preforming wire was twisted, a gap is formed between preforming wires and it is immersed in the molten metal of aluminum or an aluminum containing alloy, and excessive aluminum or an excessive aluminum containing alloy permeates and a strand outer diameter increases,

the rate of the fiber volume falls and the fall of the bending property which influences workability is caused. Furthermore, the outer-diameter size of a compound strand is drawing 4 (b). Since thickness t of the enveloping layer 9 which covers a periphery decreases when being limited to D so that it may be shown, there is a problem that preform (plastic working) nature falls. Therefore, the purpose of this invention is to offer the manufacture approach of a fiber strengthening compound line of having the outstanding preform nature and the outstanding bending property.

[0007]

[Means for Solving the Problem] This invention summarizes two or more long fiber sent out, respectively in order to give the outstanding preform nature and the outstanding bending property in the shape of a bundle, considers as a fiber bundle (yarn), guides the core wire which comes to bundle two or more fiber bundles (yarn) to the molten metal tub which filled the molten metal of aluminum or an aluminum containing alloy to coincidence, is immersed, and offers the manufacture approach of a fiber strengthening compound line of make aluminum or an aluminum containing alloy adhere to the periphery of a fiber bundle (yarn) continuously.

[0008]

[Function] According to this invention, by elaborating on two or more bundles of fiber bundles (yarn) which consist of two or more long fiber, the gaps between fiber bundles (yarn) decrease in number, and the structure of core wire becomes dense. The flexural rigidity of a compound strand improves by this. Furthermore, the outer diameter of the fiber bundle (yarn) on which two or more bundles of reduction of spacing elaborated is minor-diameter-sized, and the thickness of covering of the aluminum prepared in the molten metal of aluminum or an aluminum containing alloy on the periphery of a fiber bundle (yarn) at the time of immersion or an aluminum containing alloy can be made to increase.

[0009]

[Example] Hereafter, the manufacture approach of the fiber strengthening compound line of this invention is explained to a detail. The explanation which overlaps since the citation figure same about the part which has the same configuration and same function as the conventional technique is attached is omitted.

[0010] Drawing 1 (a) (b) The sectional view of a fiber strengthening compound line showing the example of this invention is shown, and it is (a). Compound core-wire 10A which bundled further two or more fiber bundles (yarn is called hereafter.) 10 which twist two or more silicon carbide fiber, and are constituted is shown. (b) The compound strand 11 which has the enveloping layer 9 of aluminum or an aluminum containing alloy on the periphery of ** and compound core-wire 10A is shown.

[0011] Drawing 2 shows the manufacturing installation of a fiber strengthening compound line which manufactures the above-mentioned compound strand 11, and by sending out the above-mentioned yarn 10 from two or more bobbins 12, and being bundled, it is set to compound core-wire 10A, and is guided to the preheating furnace 13 which performs a preheat treatment. Compound core-wire 10A by which the preheating was carried out with the preheating furnace 13 is guided to the molten metal layer 16 with which the molten metal 15 of aluminum or an aluminum containing alloy was filled by the roll 14.

[0012] It is immersed in a molten metal 15 by compound core-wire 10A guided to the molten metal tub 16. In the molten metal tub 16, further two or more rolls 14 are formed, and compound core-wire 10A is constituted so that it may be immersed in immersion 15 covering predetermined die length in the molten metal layer 16.

[0013] Compound core-wire 10A can be pulled up up through the drawing dice 17, after fully being immersed in a molten metal 15. The compound strand 11 is continuously manufactured by failing to extract the molten metal 15 which adhered to the periphery by this, and carrying out plastic working to a further predetermined outer diameter.

[0014] Thus, by sending out yarn 10 to coincidence and compound-izing it from two or more bobbins 12, the structure of compound core-wire 10A arranged in the core of the compound strand 11 according to the application can be set as arbitration, and the rate of the fiber volume of the compound strand 11 manufactured improves. That is, when formed with the same outer diameter as the conventional compound strand, by twisting fiber, structure becomes dense and can arrange much long fiber. It

contributes to the flexural rigidity of a compound strand by considering as the above-mentioned configuration about application to the transmission line.

[0015] Moreover, when the structure of a fiber part becomes dense, the outer diameter of compound core wire is minor-diameter-ized. Therefore, if you make it immersed to a molten metal, aluminum or an aluminum containing alloy can be made to adhere to the periphery of compound core wire thickly, and the outstanding preform nature can be given to a compound strand.

[0016]

[Effect of the Invention] According to the manufacture approach of the fiber strengthening compound line of this invention, summarize two or more long fiber sent out, respectively in the shape of a bundle, and it considers as a fiber bundle (yarn) as explained above. Since the core wire which comes to bundle two or more fiber bundles (yarn) is guided to the molten metal tub which filled the molten metal of aluminum or an aluminum containing alloy to coincidence, and it is immersed and was made to make aluminum or an aluminum containing alloy adhere to the periphery of a fiber bundle (yarn) continuously, the outstanding preform nature and the outstanding bending property can be given.

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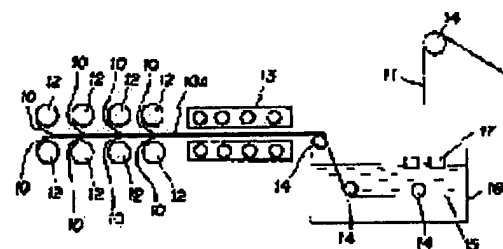
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